Columbia Wastewater and Stormwater IMP

Attachment K

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Our Columbia Waters
Integrated Management Plan
Wastewater & Stormwater

Technical Memorandum 5 *Wastewater Collection System Alternatives*

Columbia Wastewater and Stormwater Integrated Management Plan

Columbia, Missouri
January 5, 2018

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Section 1. Introduction and Objectives

The City of Columbia, Missouri (City) is working to develop an Integrated Management Plan (IMP) for the City's Sewer and Storm Water Utilities. The goal of the IMP is to develop an adaptable and affordable long-term plan that addresses the City's wastewater and stormwater management needs and meets Clean Water Act requirements. The IMP will be developed based on guidance presented in US Environmental Protection Agency's (EPA) *Integrated Municipal Stormwater and Wastewater Planning Approach Framework*[1].

Early in the IMP process, the City and their project team worked to evaluate the City's environmental resources and infrastructure assets to better define the existing condition, performance, and needs of its systems. Results from these efforts were documented in the following technical memoranda:

- Technical Memorandum 1 – Surface Water Quality and Biological Conditions
- Technical Memorandum 2 – Wastewater Collection System Assessment
- Technical Memorandum 3 – Wastewater Treatment System Assessment
- Technical Memorandum 4 – Stormwater System Assessment

These needs assessments were useful in guiding initial prioritization of potential wastewater and stormwater improvements. Priorities were further refined during a series of community outreach meetings. Information developed from these activities formed the basis for identifying potential capital and programmatic alternatives that should be evaluated as part of the IMP. Outcomes from these efforts have been documented in the following technical memoranda:

- Technical Memorandum 5 – Wastewater Collection System Alternatives
- Technical Memorandum 6 – Wastewater Treatment System Alternatives
- Technical Memorandum 7 – Stormwater System Alternatives
- Technical Memorandum 8 – Community Outreach Results

The purpose of this memorandum is to describe the assumptions and methods used to develop potential IMP alternatives and corresponding funding requirements for addressing wastewater collection system needs. A number of capital and programmatic needs were identified during the wastewater collection system assessment and documented in Technical Memorandum 2 (TM2). These needs include:

- Develop and implement strategies to support system renewal and maintenance efforts using an asset management approach, including a mechanism to establish sufficient dedicated funding for these efforts.
- Address system capacity limitations and reduce inflow and infilitration (I/I) to reduce building backups and sanitary sewer overflows (SSOs) caused by wet weather flows within the collection system.

[1] Stoner, N. and C. Giles. 2012. Integrated Municipal Stormwater and Wastewater Planning Approach Framework. June 5, 2012. Washington D.C.

- Maintain or improve the City's performance in collection system maintenance to ensure dry weather backups and SSOs due to blockages do not increase despite the challenges presented by aging infrastructure and community growth. Ensure adequate funding is available to achieve these priorities.
- Update the collection system goals to ensure they correspond to the City's short and long term collection system management goals. Achieving these goals should be measured through actionable Key Performance Indicators (KPI's) that support the City in making business decisions, allocating resources, and identifying potential challenges that could negatively impact performance and service levels.

Alternatives to address these needs were developed by HDR Engineering, Inc. (HDR), and TREKK Design Group LLC (TREKK), based on information compiled for TM2, Sewer Utility staff goals, estimated implementation costs, and community priorities. Representatives from HDR and TREKK met with City staff on January 10 and March 8 to review and confirm information and assumptions used to formulate the final alternatives presented in this memorandum.

Given the uncertainties and data gaps identified during the existing system evaluation, the alternatives outlined in this memorandum are only intended to serve as planning level estimates. These alternatives and associated costs should be refined as additional information is developed during future phases of the IMP. Findings from the collection system alternatives analysis are documented in the sections that follow.

Section 2. Level of Service Goals

The City currently has some performance criteria and production goals that are used to guide sewer operations. However, more formal level of service (LOS) goals will likely be needed in the future to adequately measure wastewater collection system performance. Through the IMP process, the City has begun the process of developing long term goals and the programmatic strategies to achieve them and track performance in this area over the 20-year IMP planning period.

Goals are typically tracked through a series of KPIs used to evaluate a utility's success in meeting strategic goals, quantify the benefits of continuous improvement initiatives, and to measure performance in managing gravity sewer infrastructure. When identifying KPIs to track, particular emphasis should be placed on developing "actionable" KPIs that support the City in making business decisions, allocating resources, and identifying potential challenges that could negatively impact performance and service levels if they are not addressed. It is typically most effective for a utility to track a relatively small number of actionable KPIs with meaningful goals that support decision making, rather than a larger number of statistical KPIs that do not inform management decisions. In recent years, the City has made significant progress towards developing long term strategies and is already collecting the key data needed to monitor collection system program progress.

However, formal goals specific to the collection system cannot yet be fully developed until the IMP process is completed and the different IMP components (wastewater treatment, stormwater system, and wastewater collection system) are prioritized to meet the community objectives. There are also existing data and information gaps that must be filled in order to develop formal goals in some key areas. For example, the City needs to develop an accurate hydraulic model to understand the costs and benefits of establishing a specific collection system design storm prior to defining the City's LOS goal for wet weather conveyance.

Therefore, defining final system performance goals on a numerical basis will not be completed at this time. These goals will instead be discussed in the context of the City's goals developed through the IMP visioning process and identified in TM2.

During the January 10 workshop, HDR and the City discussed potential goals and KPIs related to dry weather system performance, wet weather system performance, and system renewal[2]. The City's current performance, informal staff goals, and documented Sewer Utility goals were reviewed in the context of these three performance categories. Examples of goals and KPIs tracked by other regional utilities with similar priorities were also reviewed and discussed. Potential dry weather, wet weather, and system renewal goals and KPIs that the City may want to consider evaluating for use in their program going forward are described in the sections that follow.

[2] Dry and wet weather programs are interrelated and performance in one of these areas directly impacts the other. System renewal measures can support both the dry and wet weather system performance by reducing failures and public sector I/I.

2.1 Dry Weather System Performance Goals

The primary methods used to measure LOS in dry weather performance are dry weather backups and SSOs. These are typically measured in the number of these events annually per 100 miles of pipe, with a particular emphasis on the events the City has the greatest direct control over; those caused by blockages or structural failures on publicly owned infrastructure.

The City's performance in this area in recent years is in line with industry standards for effective utility management. The City has maintained an average of less than 2 events per year per 100 miles every year since 2010. Recommended KPIs to track and measure progress in dry weather system performance are listed below, along with a summary describing the KPI.

LOS Measurement - Dry Weather Backups and SSOs per 100 miles of pipe:

- Number of Dry Weather Backups and SSOs per 100 miles of pipe.
- Cleaning Goal Compliance – A measure of progress towards meeting the City's proactive cleaning strategy. This is measured by determining what percentage of pipes were able to be cleaned on or before their scheduled cleaning date based on the City's proactive maintenance policy (currently 5 years for accessible pipes).
    - Cleaning Productivity – A measure of the output of the cleaning program. This is measured by the miles of pipe cleaned in comparison to the mileage that needs to be cleaned each year to meet the City's proactive maintenance policy.
    - Long Term Cleaning Workload Tracking – A measure of the long term mileage needed to be cleaned in order to meet goals. Tracked in order to identify future changes to workload so the superindent can plan for future peaks and valleys in cleaning work needed.
    - Short Term Cleaning Workload Tracking – A measure of pipes that will come due in the near term (usually 3, 6 , or 12 month increments). Tracked in order to identify near term changes in workload so management can plan accordingly (i.e. focus more resources on cleaning than Closed Circuit Television (CCTV) in a particular month if needed to meet goals).

2.2 Wet Weather System Performance Goals

Wet weather LOS is often measured by the number of wet weather backups and SSOs per year. System performance during wet weather is measured by SSO rates, typically measured in terms of SSOs per 100 miles of pipe. During times of excessive wet weather, system flows can reach levels that cannot be feasibly conveyed. Therefore, it is preferable to also measure wet weather LOS relative to the ability to convey flows produced during a specific design storm event. Some regional utilities have established design LOS of a 10-year or 5-year storm event, although others use more or less frequent events such as the 2-year or 50-year storms depending on their specific performance and system goals.

The City's performance in this area in recent years, along with a description of existing data gaps in flow monitoring and hydraulic modeling, is documented in TM2 and discussed in **Section 3**. The City intends to establish LOS goals for the collection system but first needs a tool to evaluate the costs of improvements to achieve each LOS and prioritize these relative to other system needs. In order to do so, the City needs to update their existing hydraulic model. After this has been completed, the City will be able to define formal wet weather LOS goals.

Examples of KPIs typically used by wastewater utilities to measure progress in wet weather system performance are listed below. Specific and appropriate KPIs will be selected during subsequent phases of the IMP when more data are available.

- Total Wet Weather Backups and SSOs per 100 miles of pipe
- Wet Weather Backups and SSOs per 100 miles of pipe for events below collection system design storm event
- System Performance Understanding – A measurement of knowledge gaps indicating what percentage of areas have accurate flow and capacity data available for decision makers. Note that this may not be necessary for all areas wtihin the system.
- Percentage of System Able to Convey Design Storm – A measurement of the percentage of the system (measure both by line segments and length) able to convey the design storm.
- I/I Reduction Achieved – A quantificiation of the I/I reduced within a specfic basin or sub-basin by City's efforts.
- Cost Effectiveness of I/I Reduction – A measurement of the cost of I/I reduction, typically tracked at the project or sub-basin level.

2.3 System Renewal Goals

The primary methods used to measure system renewal goals are typically based on the quantity of renewal work completed, and the condition of the system based on CCTV assessment and manhole inspections. Renewal needs vary based on system age, material, design standards, and level of risk acceptable by the utility. Details of the City's current condition assessment and system renewal programs are provided in TM2 and **Section 3**.

Recommended KPIs to track to measure progress in wet weather system performance are listed below, along with a summary describing the KPI.

- System Renewal Output – Tracked both by percentage of system and mileage renewed.
    - Contracted System Renewal Output – A measure of the amount of contracted renewal work completed each year (currently mainly consisting of CIPP lining of pipes and contracted manhole rehabilitation).
    - In-House System Renewal Output – A measure of the amount of renewal work completed by utility staff per year.
- CCTV Goal Status – A measure of the amount of CCTV assessment completed relative to the City's goals.
    - CCTV Output – A measure of the output of the CCTV program. This is measured by the miles of pipe televised in comparison to the City's goal.
    - Percentage Inspected – A measure of the amount of the system televised relative to the City's programmatic needs. This KPI can be tracked on a systemwide basis, or by pipe material, age, or basin. Note that although the City must inspect sewer and stormwater pipes associated with new construction before accepting the work, many of these pipes do not necessarily need to be reinspected frequently thereafter. This would all the City to focus CCTV resources on the areas where they provide the greatest value.
- Manhole Inspection Goal Status – A measure of the City's compliance with manhole inspection goals. When accessed for cleaning, all manholes currently receive a brief, high-level inspection intended to identify significant strucutral issues or I/I sources. Detailed manhole inspections have primiarly been focused in high I/I areas.

Section 3. Funding Scenario Development

As mentioned previously, uncertainties and data gaps that currently exist in the collection system preclude the development of specific project recommendations or alternatives at this time. Instead, planning level estimates were identified to characterize the expected additional level of investment required to address system needs, anticipated regulatory drivers, and City goals over the next 20 years (the IMP planning period). It is important to note that these estimates represent the investments and activities needed **in addition to** the resources the Sewer Utility currently manages or are otherwise already dedicated. Three potential funding level scenarios were used to guide the analysis. They are broadly defined as follows:

- **Level 1 Funding (Level 1) –** Funding needed to **provide the minimum** LOS that meets both community-wide expectations and **existing** regulatory requirements over the 20-year IMP planning period.
- **Level 2 Funding (Level 2) –** Funding needed to **exceed the minimum** LOSthat meets community-wide expectations and **more proactively** meets existing regulatory requirements over the 20-year IMP planning period.
- **Level 3 Funding (Level 3) –** Funding needed to **address all** forecasted infrastructure needs and proactively meet **both** existing and forecasted regulatory requirements over the 20-year IMP planning period.

The estimates include potential additional capital costs, operation and maintenance costs, and costs associated with necessary planning or data collection activities needed over the 20-year IMP planning period. The resulting spending differences between each funding level presented above are the product of assumptions related to the total project implementation cost, project scheduling, and the timing of known regulatory drivers. Funding level estimates were developed for 10 major sanitary sewer collection system project categories focused on improving infrastructure, customer service, and water quality. These categories are as follows:

- Wet Weather Program Planning and Management
- Asset Management Support
- System Renewal and Public I/I Reduction
- System Capacity Enhancement and Private I/I Reduction
- Building Backup Alleviation
- Private Common Collector Elimination
- System Expansion
- Cleaning Program
- Pump Station Repair and Rehabilitaiton (R/R)
- Annual Sewer Improvements

These program areas and funding assumptions were reviewed and refined during workshops with City staff. Methodologies used to develop funding level estimates for each of these project categories are described in the sections that follow. Detailed costs forecasts for each funding level are presented in **Attachment A**. Note that costs were allocated to specific years for

planning purposes only and help facilitate comparisons between the alternative levels. Actual annual costs and timing of projects will be addressed in the final IMP.

3.1 Wet Weather Program Planning and Management

One of the City's primary goals identified during IMP visioning was to address system capacity limitations and reduce building backups and SSOs caused by wet weather flows in the collection system. Addressing the performance of the collection system during major wet weather events has been a primary area of focus for the City in recent years. The City has continually worked to reduce overflows and backups through a combination of I/I reduction efforts, operational changes, and capacity improvement projects.

The City would like to establish a LOS goal for the collection system and develop a plan to meet that goal (e.g., convey a specific design storm event without backups or SSOs). In order to determine the preferred LOS goal, the City first needs to be able to evaluate the costs of improvements to achieve each LOS. Once these needs have been identified, the resources needed to meet different wet weather LOS and corresponding benefits can be evaluated along with other capital expenditures. This will allow the City to prioritize these needs relative to other needed improvements.

The City's most recent hydraulic model is based on flow monitoring data that is over 15 years old and had significant data gaps that compromises model accuracy. These data are outdated and the model is not sufficiently accurate to develop the City's long term capacity improvement needs with a high degree of confidence. The first step in the planning process is to obtain updated system wide flow monitoring data to use as the basis for calibrating and refining an accurate hydraulic model of the collection system. This model will then be used to identify funding needs and ultimately develop a long term improvement plan to address the capacity issues present within the system. Note that the improvements will likely be a combination of I/I reduction and collection system capacity improvements.

Estimated costs for flow monitoring and hydraulic model refinement were used as the basis for estimating the funding needs for the first steps in developing the wet weather planning and management program. Additional resources will be needed to manage future program activities. These will likely include planning to address existing capacity restrictions and future growth, along with the management of I/I reduction efforts. Assumptions used to develop the funding scenarios are as follows:

- **Level 1 – Hydraulic Model Refinement and Lower Level of Program Management Support**
    - $600,000 total for flow monitoring and hydraulic model refinement early in the planning period.
    - On average, $100,000 annually for program management support over the 20-year planning period.
    - The addition of two new engineering staff members to help manage and execute the program and one new staff truck to be replaced every 10 years.

- **Level 2 – Hydraulic Model Refinement with Medium Level of Program Management Support**
  - $600,000 total for flow monitoring and hydraulic model refinement early in the planning period.
  - On average, $200,000 annually for program management support over the 20-year planning period.
  - The addition of two new engineering staff members to help manage and execute the program and one new staff truck to be replaced every 10 years.
- **Level 3 – Hydraulic Model Refinement with Higher Level of Program Management Support**
  - $600,000 total for flow monitoring and hydraulic model refinement early in the planning period.
  - On average, $300,000 annually for program management support over the 20-year planning period.
  - The addition of four new engineering staff members to help manage and execute the program and two new staff trucks to be replaced every 10 years.

3.2 Asset Management Support

As the City transitions to a more asset management based approach for collection system management activities, they will be able to forecast maintenance, condition assessment, and renewal investment needs with a higher level of confidence, justify appropriate investment levels, focus limited resources, and facilitate knowledge transfer within the organization. Development and implementation of the asset management program and corresponding strategies will require additional internal and external resources. For initial planning purposes, the funding scenarios assume that external consultants will be retained to assist with asset management support. As the program develops over time, these estimates can be refined to incorporate the appropriate mix of internal and external resources. Assumptions used to develop funding scenarios for asset management support are as follows:

- **Level 1 – Low Level Investment in Asset Management**
  - On average, $75,000 per year over the 20-year planning period.
- **Level 2 – Medium Level Investment in Asset Management**
  - On average, $150,000 per year over the 20-year planning period.
- **Level 3 – High Level Investment in Asset Management**
  - On average, $250,000 per year over the 20-year planning period.

3.3 System Renewal & Public I/I Reduction

The City owns and operates over 715 miles of gravity sewer lines and force mains. The estimated replacement costs for this infrastructure is over $700 million. If not addressed, this existing infrastructure will age, deteriorate, and increase the occurrence and frequency of overflows and backups in the system. Proactive condition assessment and renewal of this infrastructure would allow the City to address aging infrastructure through cost-effective, trenchless rehabilitation techniques that minimize disruption to the public. These renewal activities also address a portion of the infiltration entering the system from public sources, which

may reduce backups and SSOs. In addition, these improvements may mitigate potential exfiltration from the sewer system through broken pipes that may adversely affect water quality. If the City is unable to proactively address these system renewal needs, expensive emergency repairs that are disruptive to the community will also increase. In addition, increased funding would allow the City to more aggressively eliminate significant public inflow from sources such as curb inlets, leaky manhole covers, and currently unidentified direct or indirect stormwater connections.

The City's current condition assessment and system renewal program for pipes and manholes is detailed in TM2. The City is currently CIPP lining approximately 30,000 feet or 5.7 miles of pipe each year ($2.7 million annually), as well as completing point repairs. This current system renewal rate equates to approximately 0.8% of the system renewed on an annual basis. Funding for this system renewal work was provided through the 2013 bond issue that established funding for a five year period. This funding is primarily focused on rehabilitation of public infrastructure in areas that experience high I/I. This annual budget of $2.7 million is available through 2019, at which point a new funding source will need to be secured. To sustain the LOS expected by the public, a consistent long term funding source for infrastructure renewal is needed.

City staff has identified a backlog of more than 31 miles of trenchless rehabilitation and more than 150 pipe point repairs to address I/I or structural deficiencies. This represents an existing backlog of approximately $9 million in necessary, near-term system renewal work on pipes alone. However, the unidentified system renewal needs that will be discovered over the IMP planning period through future condition assessment efforts and those that will arise as the infrastructure ages are far greater.

HDR developed an initial estimate of future system renewal needs based on pipe and manhole ages and materials within the City's system, and found that approximately 105 miles of pipe and 3,240 manholes. Costs to address these needs were developed by HDR based on experience with other similar regional utilities. The costs were reviewed with City staff, and refined based on the City's experience with local infrastructure condition and construction methods. This resulted in an estimate of approximately $74 million in infrastructure renewal needs over the IMP planning period, including the existing backlog.

Funding estimates were established based on addressing these system renewal needs over different time periods. If the City can dedicate more resources to system renewal, it is anticipated that this will benefit the system in multiple ways and help the City achieve their LOS goals more quickly. This proactive system renewal work will reduce health, safety, and water quality issues associated with structurally deficient pipes and blockages, and will have the added benefit of helping the City reduce I/I in publicly owned infrastructure. Collectively, these improvements will reduce the number and magnitude of emergency repairs, alleviate wet weather capacity issues at certain locations within the collection system, and reduce exfiltration which will improve water quality and help to address stream impairments throughout the City.

Assumptions used to develop funding scenarios for system renewal are listed below. Note that while the City's existing staffing level is anticipated to be adequate to execute system renewal

work at current funding levels, it is anticipated that the City will need additional resources to execute greater volumes of renewal work.

- **Level 1 – Maintain Current Funding Level for System Renewal**
  - Fund projects currently identified in the CIP
  - Maintain $2.7 million annual funding for system renewal. This level of funding would address projected renewal needs within 27 years.
- **Level 2 – Increase Funding Level for System Renewal to Address Estimated Needs Within 20 Years**
  - Fund projects currently identified in the CIP.
  - Increase system renewal funding to $3.7 milion annually.
  - Add two new CCTV staff, two new repair crew staff, one inspector and two new staff trucks to be replaced every 10 years.
  - Add 1 new CCTV Truck to be replaced every 10 years.
- **Level 3 – Increase Funding Level for System Renewal to Address Estimated Needs Within 15 Years**
  - Fund projects currently identified in the CIP.
  - Increase system renewal funding to $4.9 milion annually.
  - Add two new CCTV staff, two new repair crew staff, one inspector, and two new staff trucks to be replaced every 10 years.
  - Add 1 new CCTV Truck to be replaced every 10 years.

3.4 System Capacity Enhancement and Private I/I Reduction

The scope of the program and level of funding needed for system capacity enhancements will ultimately be determined based on the wet weather program management and planning activities discussed above. Capital improvements needed to meet the City's desired level of wet weather service will likely include a combination of capacity improvement projects and I/I reduction efforts.

Public I/I source mitigation is captured under asset renewal projections. Therefore, private I/I control is the primary focus under this program. The cost-effectiveness of private I/I control is highly dependent upon the source and location. For example, inflow reduction from downspout and sump pump disconnections are usually very cost-effective, while lateral replacements and foundation drain disconnections may be more costly than beneficial. The City should evaluate private I/I costs compared to system capacity improvements to determine the most cost-effective strategy to address wet weather challenges. In addition, the City should reevaluate the implementation barriers that limit effectiveness of their current private I/I program.

System capacity enhancement and private I/I reduction needs will be further refined after hydraulic model development and wet weather planning. The assumptions used to develop system capacity enhancement funding levels are as follows:

- **Level 1 – Average of $2 Million Annually for System Capacity Enhancement Program over the 20-Year Planning Period**
  - Fund projects currently identified in the CIP.

  - Assume average funding of $2 million annually for capital projects to enhance system capacity or reduce private I/I.
  - Additional engineering staff to assist with program execution (these staff are identified in Section 3.1 Wet Weather Program Planning and Management)
- **Level 2 – Average of $4 Million Annually for System Capacity Enhancement Program over the 20-Year Planning Period**
  - Fund projects currently identified in the CIP.
  - Assume average funding of $4 million annually for capital projects to enhance system capacity or reduce private I/I.
  - Additional engineering staff to assist with program execution (these staff are identified in Section 3.1 Wet Weather Program Planning and Management)
- **Level 3 – Average of $6 Million Annually for System Capacity Enhancement Program over the 20-Year Planning Period**
  - Fund projects currently identified in the CIP.
  - Assume average funding of $6 million annually for capital projects to enhance system capacity or reduce private I/I.
  - Additional engineering staff to assist with program execution (these staff are identified in Section 3.1 Wet Weather Program Planning and Management)

3.5 Building Backup Alleviation

There are a number of buildings within the City that experience repeated wet weather backups. These are typically homes or areas of older construction. Backups may be due to poor plumbing practices and/or condition, building floor elevations that were constructed too low relative to the sanitary sewer elevation, inadequate capacity in the sewer system, and private I/I sources connected to the service lateral, or other unknown issues related to individual building plumbing. Many building backups cannot be cost effectively addressed through capacity improvements to the public sewer system.

Funding estimates were established based on potential options to alleviate the backups. Level 1 is based on the lowest cost alternative, which would involve installing backflow prevention valves and other plumbing improvements on individual properties[3]. Level 2 assumes installation of low pressure sewer systems (LPS) and some limited buyouts of affected properties by the City. Level 3 assumes that all properties would be purchased by the City. It is important to note that any program developed to address building backups would have to meet applicable legal requirements for using ratepayer money to address issues on private property. Review of these legal requirements was outside the scope of the IMP.

Assumptions used to develop funding scenarios for building backup projects are as follows:

- **Level 1 – Address Building Backups Through Plumbing Improvements**
  - $500,000 allocated for backflow prevention valves and other plumbing improvements.

[3] During the course of IMP development, the Columbia City Council approved (July 3, 2017) a cost-reimbursement program to address building backups through plumbing improvements. The approved is equivalent to the IMP Level 1 recommendation.

- **Level 2 – Address Building Backups Through LPS Systems and Limited Property Purchaes.**
  - Low pressure sewer system (LPS) installation for impacted properties and limited property buyouts for a total of $5 million over the 20-year planning period.
- **Level 3 – Address Building Backups Through Extensive Property Purchases**
  - Buyout or LPS system installation for impacted properties and limited property buyouts for a total of $40 million over the 20-year planning period.

3.6 Private Common Collector Elimination (PCCE) Projects

Private common collectors (PCC) are privately-owned collection systems that serve multiple homes or businesses. PCCs typically consist of small diameter pipes that have generally not been maintained by the property owners since they were installed. Locating PCCs is also challenging, as they are not on public property and limited mapping is available.

As these are privately owned collection systems, the City does not typically have access to maintain or repair these lines. These aging PCCs are subject to blockage or failure and pose a significant public health and water quality risk; failing PCCs cause building backups, are a significant source of exfiltration that expose the public to raw sewage, and exacerbate I/I issues that ultimately contribute to overflows to local water bodies, .

The City has a dedicated program focused on eliminating these PCCs and replacing them with publicly owned sanitary sewers. This program helps to reduce building backups, improve water quality, and renew aging infrastructure. The City has developed planning level cost estimates for the elimination of known PCCs; these estimated costs were used to help develop projected costs for this program.

Assumptions used to develop PCCE funding levels included in this evaluation are as follows:

- **Level 1 – Address One-Third of Known PCCs During IMP Planning Period**
  - Fund projects currently identified in the CIP.
  - Fund 1/3 ($3.2 million) of known remaining projects.
- **Level 2 - Address Two-Thirds of Remaining Known PCCs During IMP Planning Period**
  - Fund projects currently identified in the CIP.
  - Fund 2/3 ($6.4 million) of known remaining projects.
- **Level 3 – Address More than Two-Thirds of Known PCCs During IMP Planning Period**
  - Fund projects currently identified in the CIP.
  - Assumes additional $9.5 million for known and unknown remaining projects.

3.7 System Expansion

This project category includes funding for gravity conveyance and pump station projects necessary to expand the system for new growth areas or to increase existing system capacity to accommodate the increased wastewater flows generated by growth in the City. Increased

capacity may also be needed to accommodate regionalization activities that would reduce the number of small wastewater treatment plants (WWTPs) and improve stream water quality in the area. As discussed in Technical Memorandum 3, more than 100 small WWTPs have been eliminated since construction of the Columbia Regional Wastewater Treatment Plant (CRWWTP) and approximately 11 more are currently joining either the CRWWTP or Boone County Regional Sewer District systems. System capacity should be sufficiently maintained to continue supporting these water quality improvement projects.

As noted in TM2, in recent years Columbia has been the fastest growing city in the state of Missouri. Community growth rates and the locations of new growth are driven by many factors that cannot always be readily predicted by the Sewer Utility. Additionally, the prioritization of system expansion projects relative to other system needs can be driven by community leadership priorities that are outside the control of the Utility. It is important that adequate funding is available to meet the community's priorities in this area, ensure the City can sustain their desired LOS, and comply with regulatory requirements as growth increases flows to the existing system.

Historically, the level of funding the City has dedicated to these projects has varied based on growth rates, system expansion locations, and community priorities. Past projects and those currently in the CIP were used as the initial basis for estimating future system expansion needs. An annual average funding level was determined for each IMP funding scenario in order to ensure the City has sufficient funding to meet community priorities.

Assumptions used to develop funding scenarios for system expansion projects are as follows:

- **Level 1 – $2 Million in Funding Per Year for System Expansion Projects**
  - Fund projects currently identified in the CIP
  - Continue funding at an average of $2 million per year
- **Level 2 – $3 Million in Funding Per Year for System Expansion Projects**
  - Fund projects currently identified in the CIP
  - Continue funding at an average of $3 million per year
- **Level 3 - $4 Million in Funding Per Year for System Expansion Projects**
  - Fund projects currently identified in the CIP
  - Continue funding at an average of $4 million per year

3.8 Cleaning Program

An evaluation of the City's cleaning program was presented in the TM2. The City's maintenance program has showed a strong trend of continuous improvement over the past several decades. The City has worked to reduce the rate of dry weather backups and overflows, and the results are in line with industry standards for an effective maintenance program. However, the Utility is facing challenges that are anticipated to make it harder to continue to meet proactive cleaning goals. These challenges include:

- Columbia is experiencing continued growth of the collection system maintained by the Utility. This growth increases cleaning demands.

- In recent years, the City has increased the mileage of CCTV inspections in order to proactively assess the condition of the collection system and identify and mitigate structural issues and I/I sources. This increases the amount of reactive cleaning needed to support the CCTV crews, and decreases the resources available for proactive cleaning.
- The cleaning trucks have recently moved to a new dispatch facility at the CRWWTP, which has increased the driving time for the cleaning crews to much of the City.

In order to meet these future challenges, optimize the use of resources, and to continue the trend of improved customer service, the City should build on these past successes and move towards implementing an asset management approach for scheduling and executing cleaning of the system. The program would focus on cleaning the right pipes at the right time, e.g., cleaning dirty pipes more often while cleaning relatively clean pipes less often. This would help the City to address the challenges facing the cleaning program and continue the trend of relatively low amounts of dry weather overflows and backups, enabling the City to maintain or exceed LOS goals.

During the alternatives analysis workshop, future cleaning needs and potential optimized cleaning schedules were reviewed. Cleaning resource needs were evaluated for each scenario in the context of anticipated future growth. Although the final scope of the optimized cleaning program has not yet been fully defined, it was determined that for all reasonable scenarios the addition of a 4th cleaning truck and crew will be needed in order to maintain the City's current LOS.

Therefore, Level 1 and Level 2 funding scenarios assume the addition of the 4th cleaning truck and crew, and that an asset management approach to scheduling and executing the cleaning program will be implemented. The Level 3 funding scenario assumes that a 5th cleaning truck will be added. Note that these cleaning resources will also be used to support the sanitary and storm sewer CCTV inspection programs.

- **Level 1 – Add a 4th Cleaning Truck and Implement Asset Management Approach to Cleaning Program**
  - Assume one new cleaning truck (replaced every 10 years) and two new cleaning staff.
- **Level 2 – Add a 4th Cleaning Truck and Implement Asset Management Approach to Cleaning Program**
  - Same as Level 1.
- **Level 3 – Add a 4th and 5th Cleaning Truck and Implement Asset Management Approach to Cleaning Program**
  - Assume two new cleaning trucks (replaced every 10 years) and two new cleaning staffs (4 people total). The additional trucks would also support the sanitary and storm sewer CCTV inspection programs.

3.9 Pump Station Repair and Rehabilitation (R/R)

This project included funding for pump station R/R improvement projects. As pump stations age, mechanical, electrical, process, and structural repairs are required. This can involve both specific equipment replacement, improvements required for code compliance, and complete rehabilitation of aging facilities. Note that this funding is not intended to cover normal operation and maintenance (O&M) needs.

Known R/R projects and general pump station facility needs were reviewed with the City during the workshops. The City's pump stations are in generally good condition and there were no known current major project needs identified by the City. However, pump station mechanical and electrical equipment, as well as the structures themselves, have a finite useful life and R/R projects will be needed within the IMP planning period to keep these stations operating at the level needed to meet the City's desired LOS.

Long-term funding R/R needs were estimated for the three largest pump stations (Clear Creek, Little Bonne Femme, and Cow Branch pump stations) based on a model that HDR previously developed. This model takes into account the size of the pump station and useful life of equipment and structures in order to provide planning level estimates of future R/R needs. For the Level 1 funding scenario, only funding for major R/R expenses at the three largest pump stations was included. For Level 2 and Level 3, additional funding was allocated for unidentified R/R needs at the smaller pump stations.

Assumptions used to develop funding scenarios for pump station R/R projects are as follows:

- **Level 1 – Allocate Pump Station R/R Funding for Major Pump Stations**
  - Fund improvements within planning period to the three largest pump stations based on estimated needs and physical life of equipment and facility.
  - R/R for small pump stations are assumed to be included in normal O&M expenditures.
- **Level 2 – Allocate Pump Station R/R Funding for Both Major and Minor Pump Stations**
  - Fund improvements within planning period to the three largest pump stations based on estimated needs and physical life of equipment and facility.
  - Assume $2 million for unidentified R/R needs at smaller pump stations.
- **Level 3 - Allocate Pump Station R/R Funding for Both Major and Minor Pump Stations**
  - Same as Level 2.

3.10 Annual Sewer Improvements

This project includes funding to address unanticipated sewer improvements and repairs that may be needed in any given year. The Utility's budget for these improvements has varied over time and has averaged approximately $600,000 per year for the last five years. According to City staff, this amount has been sufficient to address needs that are identified. Conservatively, all funding scenarios include $1 million per year for this category.

Section 4. Summary

HDR and TREKK worked with the City to review existing collection system goals and develop alternatives to address system and program needs identified in TM2. Specific needs included supporting renewal and maintenance efforts using an asset management approach, addressing capacity limitations to reduce backups and SSOs, and improving maintenance performance to reduce the potential for dry weather backups and SSOs as existing infrastructure ages.

The City currently has some performance criteria and production goals that are used to guide sewer operations. Through the IMP process, the City has started developing strategies necessary to refine those goals and track performance over the 20-year IMP planning period. Potential dry weather, wet weather, and system renewal goals and KPIs that the City may consider implementing in their program going forward were identified during this evaluation but specific goals were not finalized. Appropriate goals and KPIs will be developed over time as the IMP is implemented and more data become available.

Potential capital and programmatic alternatives and planning level costs were identified to characterize the expected additional level of investment required to address collection system needs, anticipated regulatory drivers, and City goals over the 20-year IMP planning period. Cost estimates include potential additional capital, operation and maintenance, and necessary planning or data collection costs. Estimates were developed for three potential funding level scenarios and 10 project categories. The three funding levels represent increasingly proactive investments that the City could pursue to make infrastructure upgrades and water quality improvements through the IMP.

Results of the alternatives evaluation indicate that between $170 million and $340 million of additional investment will be needed to address wastewater collection system needs over the IMP planning period (Table 1). In subsequent analyses, these cost estimates will be combined with estimates for the wastewater treatment and stormwater collection system and evaluated to identify the level of investment that appropriately balances overall costs with anticipated community benefits. These subsequent evaluations will also consider impacts on future residential utility bills and community-wide affordability.

Table 1. Summary of Collection System Capital and Programmatic Costs, in 2017 Dollars.

Project Categories	20-Year Funding Scenario		
	Level 1	**Level 2**	**Level 3**
Wet Weather Program Planning and Management	$5,690,000	$7,490,000	$12,580,000
Asset Management Support	$1,350,000	$2,700,000	$4,500,000
System Renewal and Public I/I Reduction	$50,072,000	$74,162,000	$81,422,000
System Capacity Enhancement and I/I Private Reduction	$47,342,000	$71,342,000	$101,342,000
Building Backup Alleviation	$500,000	$5,000,000	$40,000,000
Private Common Collector Elimination	$5,932,000	$9,098,000	$12,265,000
System Expansion	$37,117,000	$48,117,000	$59,117,000
Cleaning Program	$2,840,000	$2,877,000	$5,680,000
Pump Station Repair and Rehabilitation (R/R)	$1,914,000	$3,954,000	$3,954,000
Annual Sewer Improvements	$18,000,000	$18,000,000	$18,000,000
Total	**$170,757,000**	**$242,740,000**	**$338,860,000**
Additional Staff*	**Engineer (2) Technician** (2)**	**Engineer (2) Technician (7)**	**Engineer (4) Technician (9)**
Additional Equipment	**Cleaning Truck (1) Field Truck (1)**	**Cleaning Truck (1) CCTV Truck (1) Field Truck (3)**	**Cleaning Truck (2) CCTV Truck (1) Field Truck (4)**

*Additional staff estimates include only those staff for which the Utility would incur additional costs. The estimates do not include existing or currently planned staff. These staffing estimates (and associated costs) were developed for initial IMP planning purposes. Future staffing levels, as well as specific positions, should be reevaluated as the IMP progresses over time.

**In this table, the term “technician” refers to all operators, inspectors, and technicians.

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Attachments

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Attachment A. Detailed Cost Forecasts

Table A.1. Level 1 Collection System Capital and Programmatic Cost Forecast, in 2017 Dollars. Estimates include potential additional capital, operation and maintenance, and planning costs over the IMP planning period. Because the City's 2018 budget is already in development, the IMP assumes that no additional funding would be dedicated to any of the three levels described above until 2019. *Note that costs were allocated to specific years for planning purposes only and help facilitate comparisons between the alternative levels. Actual annual costs and timing of projects will be addressed in the final IMP.*

Columbia Collection System
Capital and Programmatic Cost Estimates - Level 1 Service

Project Category	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Wet-Weather Program Planning and Management	$ -	$ -	$ 505,000	$ 680,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000
Asset Management	$ -	$ -	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000
System Renewal Program	$ -	$ -	$ 2,700,000	$ 2,700,000	$ 3,441,030	$ 3,211,163	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,920,000
System Capacity Enhancement	$ -	$ -	$ 5,862,251	$ 2,000,000	$ 4,543,200	$ 2,000,000	$ 2,317,900	$ 2,809,320	$ 5,809,650	$ 2,000,000
Building Backup Allevation	$ -	$ -	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ -	$ -	$ -
Private Common Collector Elimination	$ -	$ -	$ 885,000	$ 945,000	$ 935,000	$ 211,111	$ 211,111	$ 211,111	$ 211,111	$ 211,111
System Expansion	$ -	$ -	$ 1,560,000	$ -	$ 2,750,000	$ 83,388	$ 10,000,000	$ -	$ 724,045	$ 2,000,000
Cleaning Program	$ -	$ -	$ 380,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000
Pump Station R/R	$ -	$ -	$ -	$ 252,450	$ 885,358	$ -	$ -	$ -	$ -	$ -
Other - Annual Sewer Improvement Cost	$ -	$ -	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
Annual Total	**$ -**	**$ -**	**$ 13,067,251**	**$ 7,882,450**	**$ 14,139,588**	**$ 7,090,662**	**$ 16,814,011**	**$ 7,205,431**	**$ 10,929,806**	**$ 8,616,111**
Cumulative Total	**$ -**	**$ -**	**$ 13,067,251**	**$ 20,949,701**	**$ 35,089,289**	**$ 42,179,951**	**$ 58,993,962**	**$ 66,199,393**	**$ 77,129,199**	**$ 85,745,311**

Columbia Collection System
Capital and Programmatic Cost Estimates - Level 1 Service

Project Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Wet-Weather Program Planning and Management	$ 280,000	$ 280,000	$ 305,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000	$ 280,000
Asset Management	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000
System Renewal Program	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000	$ 2,700,000
System Capacity Enhancement	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000
Building Backup Allevation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Private Common Collector Elimination	$ 211,111	$ 211,111	$ 211,111	$ 211,111	$ 211,111	$ 211,111	$ 211,111	$ 211,111	$ 211,111	$ 211,111
System Expansion	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000
Cleaning Program	$ 130,000	$ 130,000	$ 380,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000
Pump Station R/R	$ -	$ -	$ -	$ -	$ 776,220	$ -	$ -	$ -	$ -	$ -
Other - Annual Sewer Improvement Cost	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
Annual Total	**$ 8,396,111**	**$ 8,396,111**	**$ 8,671,111**	**$ 8,396,111**	**$ 9,172,331**	**$ 8,396,111**	**$ 8,396,111**	**$ 8,396,111**	**$ 8,396,111**	**$ 8,396,111**
Cumulative Total	**$ 94,141,422**	**$ 102,537,533**	**$ 111,208,644**	**$ 119,604,755**	**$ 128,777,086**	**$ 137,173,197**	**$ 145,569,308**	**$ 153,965,419**	**$ 162,361,531**	**$ 170,757,642**

Table A.2. Level 2 Collection System Capital and Programmatic Cost Forecast, in 2017 Dollars. Estimates include potential additional capital, operation and maintenance, and planning costs over the IMP planning period. Because the City's 2018 budget is already in development, the IMP assumes that no additional funding would be dedicated to any of the three levels described above until 2019. *Note that costs were allocated to specific years for planning purposes only and help facilitate comparisons between the alternative levels. Actual annual costs and timing of projects will be addressed in the final IMP.*

Columbia Collection System
Capital and Programmatic Cost Estimates - Level 2 Service

Project Category	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Wet-Weather Program Planning and Management	$ -	$ -	$ 605,000	$ 780,000	$ 380,000	$ 380,000	$ 380,000	$ 380,000	$ 380,000	$ 380,000
Asset Management	$ -	$ -	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000
System Renewal Program	$ -	$ -	$ 4,305,000	$ 4,005,000	$ 4,746,030	$ 4,516,163	$ 4,005,000	$ 4,005,000	$ 4,005,000	$ 4,225,000
System Capacity Enhancement	$ -	$ -	$ 3,862,251	$ -	$ 2,543,200	$ 4,000,000	$ 4,317,900	$ 4,809,320	$ 7,809,650	$ 4,000,000
Building Backup Allevation			$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000	$ 500,000
Private Common Collector Elimination	$ -	$ -	$ 885,000	$ 945,000	$ 935,000	$ 422,222	$ 422,222	$ 422,222	$ 422,222	$ 422,222
System Expansion	$ -	$ -	$ 1,560,000	$ -	$ 2,750,000	$ 83,388	$ 10,000,000	$ -	$ 724,045	$ 3,000,000
Cleaning Program	$ -	$ -	$ 417,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000
Pump Station R/R	$ -	$ -	$ -	$ 372,450	$ 1,005,358	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 120,000
Other - Annual Sewer Improvement Cost	$ -	$ -	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
Annual Total	**$ -**	**$ -**	**$ 13,284,251**	**$ 7,882,450**	**$ 14,139,588**	**$ 11,301,773**	**$ 21,025,122**	**$ 11,516,542**	**$ 15,240,917**	**$ 13,927,222**
Cumulative Total	**$ -**	**$ -**	**$ 13,284,251**	**$ 21,166,701**	**$ 35,306,289**	**$ 46,608,062**	**$ 67,633,184**	**$ 79,149,727**	**$ 94,390,644**	**$ 108,317,866**

Columbia Collection System
Capital and Programmatic Cost Estimates - Level 2 Service

Project Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Wet-Weather Program Planning and Management	$ 380,000	$ 380,000	$ 405,000	$ 380,000	$ 380,000	$ 380,000	$ 380,000	$ 380,000	$ 380,000	$ 380,000
Asset Management	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000
System Renewal Program	$ 4,005,000	$ 4,005,000	$ 4,305,000	$ 4,005,000	$ 4,005,000	$ 4,005,000	$ 4,005,000	$ 4,005,000	$ 4,005,000	$ 4,005,000
System Capacity Enhancement	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000
Building Backup Allevation	$ 500,000	$ 500,000								
Private Common Collector Elimination	$ 422,222	$ 422,222	$ 422,222	$ 422,222	$ 422,222	$ 422,222	$ 422,222	$ 422,222	$ 422,222	$ 422,222
System Expansion	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000	$ 3,000,000
Cleaning Program	$ 130,000	$ 130,000	$ 380,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000	$ 130,000
Pump Station R/R	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 896,220	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 120,000
Other - Annual Sewer Improvement Cost	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
Annual Total	**$ 13,707,222**	**$ 13,707,222**	**$ 13,782,222**	**$ 13,207,222**	**$ 13,983,442**	**$ 13,207,222**	**$ 13,207,222**	**$ 13,207,222**	**$ 13,207,222**	**$ 13,207,222**
Cumulative Total	**$ 122,025,088**	**$ 135,732,311**	**$ 149,514,533**	**$ 162,721,755**	**$ 176,705,197**	**$ 189,912,419**	**$ 203,119,642**	**$ 216,326,864**	**$ 229,534,086**	**$ 242,741,308**

Table A.3. Level 3 Collection System Capital and Programmatic Cost Forecast, in 2017 Dollars. Estimates include potential additional capital, operation and maintenance, and planning costs over the IMP planning period. Because the City's 2018 budget is already in development, the IMP assumes that no additional funding would be dedicated to any of the three levels described above until 2019. *Note that costs were allocated to specific years for planning purposes only and help facilitate comparisons between the alternative levels. Actual annual costs and timing of projects will be addressed in the final IMP.*

Columbia Collection System
Capital and Programmatic Cost Estimates - Level 3 Service

Project Category	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Wet-Weather Program Planning and Management	$ -	$ -	$ 910,000	$ 1,060,000	$ 660,000	$ 660,000	$ 660,000	$ 660,000	$ 660,000	$ 660,000
Asset Management	$ -	$ -	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000
System Renewal Program	$ -	$ -	$ 625,000	$ 325,000	$ 1,066,030	$ 5,736,163	$ 5,225,000	$ 5,225,000	$ 5,225,000	$ 5,445,000
System Capacity Enhancement	$ -	$ -	$ 3,862,251	$ -	$ 2,543,200	$ 6,000,000	$ 6,317,900	$ 6,809,320	$ 9,809,650	$ 6,000,000
Building Backup Allevation	$ -	$ -	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000
Private Common Collector Elimination	$ -	$ -	$ 885,000	$ 945,000	$ 935,000	$ 633,333	$ 633,333	$ 633,333	$ 633,333	$ 633,333
System Expansion	$ -	$ -	$ 1,560,000	$ -	$ 2,750,000	$ 83,388	$ 10,000,000	$ -	$ 724,045	$ 4,000,000
Cleaning Program	$ -	$ -	$ 760,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000
Pump Station R/R	$ -	$ -	$ -	$ 372,450	$ 1,005,358	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 120,000
Other - Annual Sewer Improvement Cost	$ -	$ -	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
Annual Total	**$ -**	**$ -**	**$ 13,852,251**	**$ 8,212,450**	**$ 14,469,588**	**$ 18,742,884**	**$ 28,466,233**	**$ 18,957,653**	**$ 22,682,028**	**$ 22,368,333**
Cumulative Total	**$ -**	**$ -**	**$ 13,852,251**	**$ 22,064,701**	**$ 36,534,289**	**$ 55,277,173**	**$ 83,743,407**	**$ 102,701,060**	**$ 125,383,088**	**$ 147,751,422**

Columbia Collection System
Capital and Programmatic Cost Estimates - Level 3 Service

Project Category	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Wet-Weather Program Planning and Management	$ 660,000	$ 660,000	$ 710,000	$ 660,000	$ 660,000	$ 660,000	$ 660,000	$ 660,000	$ 660,000	$ 660,000
Asset Management	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000
System Renewal Program	$ 5,225,000	$ 5,225,000	$ 5,525,000	$ 5,225,000	$ 5,225,000	$ 5,225,000	$ 5,225,000	$ 5,225,000	$ 5,225,000	$ 5,225,000
System Capacity Enhancement	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000
Building Backup Allevation	$ 4,000,000	$ 4,000,000								
Private Common Collector Elimination	$ 633,333	$ 633,333	$ 633,333	$ 633,333	$ 633,333	$ 633,333	$ 633,333	$ 633,333	$ 633,333	$ 633,333
System Expansion	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000	$ 4,000,000
Cleaning Program	$ 260,000	$ 260,000	$ 760,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000	$ 260,000
Pump Station R/R	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 896,220	$ 120,000	$ 120,000	$ 120,000	$ 120,000	$ 120,000
Other - Annual Sewer Improvement Cost	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000	$ 1,000,000
Annual Total	**$ 22,148,333**	**$ 22,148,333**	**$ 18,998,333**	**$ 18,148,333**	**$ 18,924,553**	**$ 18,148,333**	**$ 18,148,333**	**$ 18,148,333**	**$ 18,148,333**	**$ 18,148,333**
Cumulative Total	**$ 169,899,755**	**$ 192,048,088**	**$ 211,046,422**	**$ 229,194,755**	**$ 248,119,308**	**$ 266,267,642**	**$ 284,415,975**	**$ 302,564,308**	**$ 320,712,642**	**$ 338,860,975**

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